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CHUMASH ARCHERY EQUIPMENT

by

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EDITOR'S NOTE

In the material culture inventory of any people who have not attained the use of firearms archery traits, where they exist, are perhaps the most useful as indicators of ingenuity and ecological adjustment. In bows and arrows the skill of the makers and of the hunters who used them is well reflected. In the craftsmanship of production these weapons exhibit not only a knowledge of the characteristics of available materials but also an understanding of the dynamics of shooting and arrow flight. Moreover the peculiar problems of hunting and warfare faced by the user of the weapon are necessarily incorporated in its design.

Unfortunately data pertaining to archery traits for North American culture groups are far from complete and often not well recorded. There are several reasons for this. The early and efficient use of firearms by Indians as they could get these shifted the survival emphasis from archery to the new weapons, and the techniques of bow and arrow making were neglected. Later on in the course of contact with Whites other items of Indian provenience such as hides, blankets and pottery were of economic value in trade whereas White settlers had no use for bows and arrows except as curiosities, often with unpleasant connotation. Add to this the fact that bow and arrow materials other than stone points usually deteriorate rapidly except under favorable conditions and we understand the paucity of available information in this ethnographic area.

The accompanying paper on Chumash archery equipment provides a body of precise information in regard to an ethnographic province sparsely reported in previous documentation. The author has examined in great detail the characteristics of a large number of bows and arrows from the Chumash territory around Santa Barbara, California, analyzed the resulting data and recorded his findings in a manner useful not only for study of the specific area but also for ethnographic comparison.

Spencer L. Rogers

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ABSTRACT

Our present knowledge of Chumash archery equipment, and its relationship to technology-subsistence activities, is quite poor. The only documented bow was collected in Santa Barbara in 1793 (Read 1892). Much of what we do know about this subject has come from native informants two centuries and more after European contact, or from a few brief descriptions made by early explorers.

For this reason the few unpublished finds of such equipment in dry caves within Chumash territory are of particular significance. These finds consist of a cache of two bows and several composite arrows from Peachtree Canyon, two self-arrows from Castro Canyon, and five arrow parts from Castro and Salisbury canyons. All of these are within the modern political boundaries of Santa Barbara County. This paper describes the material, compares it with that of neighboring cultures, and provides some inferences in regard to Chumash arrowmaking and use. Chumash fishing arrows will be excluded, since a general summary of what is known about them has appeared in a previous paper in this series (Hoover 1973).

INTRODUCTION

Despite the influence of a hundred years of European contact with the Chumash along the Santa Barbara Channel, their material culture was still obtainable, though probably quite rare, as late as the 1870's (Reichlen and Heizer 1964). Such artifacts, mostly preserved in European museums, are of considerable importance for the understanding they can provide of the culture, representing what must have been an abundant utilization of organic materials in the environment to fashion a variety of tools. Most reflect Chumash technology lost in the obscurity of an archaeological record more favorable to the recovery of bone, stone, and shell.

Most of these early Chumash collections concentrated not upon objects of daily living, but upon those which could be adapted to either European function or aesthetic appeal -- particulary basketry. Few aspects of their culture in terms of sea or land mammal hunting are represented, save for the ethnographic material collected by Vancouver along the Channel in 1793: a single bow (Read 1892; Robinson 1955), a harpoon (Read 1892; Bennyhoff 1950), and an atlatl which may not even be aboriginal in origin (Heizer 1938, 1945).

Between this sparse ethnographic picture of such few objects and an over-biased archaeological record, there is the infrequent but fortunate recovery of perishable items from dry caves in the interior of Santa Barbara and adjacent counties. Some of these caves, like those in the Cuyama, have yielded notable materials to supplement our sparse information on the Chumash (cf. Grant 1964). The Chumash archery equipment described in this paper is such a find.

The Peachtree Canyon discovery came to my attention in November, 1973, when two "locally discovered" arrows were donated to the Santa Barbara Museum of Natural History. Interestingly, two other arrows, donated to the Museum years before, were practically identical in dimensions and color markings. One had been illustrated by Grant (1965: 44, Fig. 31). Believing it improbable that these arrows would have separate origins, I began locating the donors in order to obtain more information. Eventually, I reached the discoverer and was able to piece together the fifteen-year history of their various owners and the story of their discovery.

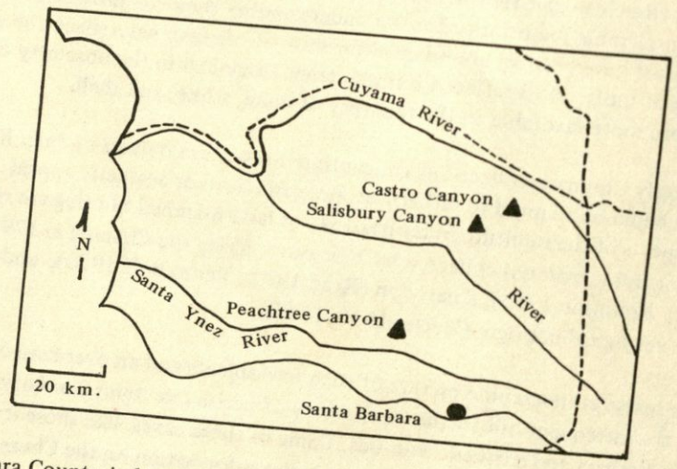
While this investigation was under way, the Castro Canyon find came to my attention, but it was not until February, 1974, that I had an opportunity to see the material. The Salisbury Canyon specimens have been known for some time, being a part of the Museum's collections and described by Grant (1964).

Before undertaking a description of these finds, I should like to note here that Appendix A, a glossary of arrow terms, is included. The definitions listed are designed for this paper; they are partly mine and partly those of Mason (1891: 46-48), Ellsworth (1950: 18-20), and Rozaire (1962). An illustration of an hypothetical composite arrow is included to clarify meaning.

Each of the three finds will now be described, beginning with Peachtree Canyon. The description is followed by a discussion and comparison of arrows from other tribes, age determinations, group ordering and inferences, and conclusions.

PEACHTREE CANYON FIND

Location and Discovery. Like many dry cave discoveries containing aboriginal material, this one was not made by an archaeologist. The material was found about 1959 while Fred Manke was deer hunting in Peachtree Canyon. (See Map.)



Map. Santa Barbara County indicating locations of Castro, Salisbury, and Peachtree Canyons.

This region is part of the Santa Ynez river system and is located within the territorial domain of the Chumash. Linguistically the area lies in the region of the San Ynez or Inezeño Chumash (Kroeber 1925: Plate 1; Landberg 1965: Fig. 1). Projecting the canyon onto Landberg's (1965: 47, Fig. 4) map for modern deer densities, the Peachtree occupies a region estimated to have a population of at least ten or more animals per sq. mile (2.6 sq. km.). Here, and a few other regions listed on the map, are the highest densities for these animals within Chumash territory. Manke reports that while hunting he came upon a small cave with an opening about 1 m. high containing the hunting equipment. There were two bows, both unstrung and standing together, and a tightly wrapped bundle of about 20-25 arrows, pointing east and lying on the disintegrated remains of a coiled basket about 50 cm. in diameter.

Upon his return to Santa Barbara, Manke gave the bows and arrows to his children as toys, and over the years they gradually disappeared. Those that have survived were acquired by various people from the Manke children.

Fortunately, four of the arrows from this cache were deposited in the Museum's collections by three different donors (Dr. Albert Heimlich and Messrs. Lance Gammill and Jack DeGrandchamp), and five more into private collections (Dr. Albert Heimlich and Messrs. Jack Coy and Campbell Grant). It is possible that other arrows are extant but remain unknown.

Bows. Manke describes the missing bows as single pieces of wood, each in length between 106 and 122 cm. and about 4 cm. in width. He does not recall the thickness. One bow was about 15 cm. longer than the other. He vaguely recalls the cross section as being lenticular, the color a dull, reddish-brown, and the form of the notches as shouldered with a somewhat bulbous extension above the notch. The material of the bowstring and bow stave was not known. When strung, however, Manke notes that both bows were single-curved with about a 30 cm. distance between the bowstring and the belly of the bow at the handgrip. Both were, apparently, self-bows.

The single comparative Chumash bow, the Vancouver specimen, is sinew-backed (Kroeber 1925: 560). Robinson (1955: 1-2) has described it as curved with slightly recurved ends. It measures 105.5 cm. in length and has width-thickness dimensions of 3.5 by 1.8 cm. The wood is yellowish-tan in color and the cross section lenticular. The nocks are pin type and the bowstring is 3-ply sinew.

Descriptive data on Chumash bows by early explorers and twentieth-century native informants are also spotty in detail. From the diary of Fr. Pedro Font, a member of Juan Bautista de Anza's crossing through Santa Barbara in 1775, there is a brief description of them. He wrote: "Their bows are small, being only about a vara long [83.8 cm.], but very strong, and all are wound with tendons and are graceful in form" (Bolton 1930: 255).

Harrington (1942: 14-15) provides additional information, based upon the memory of older Chumash informants. He notes that both the sinew-backed and self-bow were employed, with lengths from 91 to 137 cm. Bowstrings were 2 to 3-ply vegetable fiber.

The Gabrielino, southern Chumash neighbors, also used the self-bow, with lengths recorded at about 137 cm. (Johnston 1962: 34). For the region east of the Chumash, Yokuts self-bows ranged between 102 and 142 cm. in length, and their sinew-backed bows were, like the Chumash, slightly shorter, being between 81 and 132 cm. in length (Kroeber 1925: 818).

In general, it can be said that the bows Manke describes are typical of Southwestern California self-bows, and are in dimensional agreement with the Inezeño self-bows from whose territory the Manke material came.

Arrows. The accompanying composite arrows, of which ten are known, are also typically Southwestern Californian in form (Kroeber 1925: 560; Rozaire 1962: 12-13). Table 1 (in Appendix B) describes each, while Plate 1 illustrates all except one, an incomplete specimen missing its shaftment and nock.

To summarize Table 1, the Peachtree arrows consist of a cane mainshaft *(Phragmites australis* of Carrizo grass*)*, a hardwood foreshaft (unidentified wood), and a Desert Side-notched projectile point either white or gray Monterey chert. Overall lengths range from 750 to 820 mm., and mainshaft diameters are from 7 to 9 mm.

On all specimens the nock is cylindrical in shape and painted red in color; the notch is U-shaped, cut to a depth of 7-8 mm. Fletching is composed of three split tail feathers placed radially. Two (henfeathers) are from a juvenile Western Red-Tailed Hawk *(Buteo jamaicensis),* while the third (cockfeather) is from a juvenile-adult (3 to 4 year old) Golden Eagle *(Aquila chrysaetos).* These are bound by 9 to 12 mm. of proximal fletching sinew, and 22 to 28 mm. of distal fletching sinew. Beneath the former is a purple riband of the same width on two specimens, a green riband on three others, and no riband on the remainder. No riband is present beneath the distal fletching sinew. Cockfeather orientation for the nine complete arrows is perpendicular or at 90° to the notch on three specimens, 135° on four, and 30° and 45° on the remaining two.

Length of shaftments varies from 105 to 117 mm. On all arrows the shaftment is divided into thirds to form a three-color riband, the center one of which is unpainted. The proximal band is black on green and ranges from 28 to 43 mm. in length; the undecorated center is from 30 to 54 mm. in length; and the distal band is consistently red and varies from 23 to 35 mm. in length.

Mainshafts range from 57.5 to 62.8 cm. in length and are trimmed at their distal ends to receive the inserted foreshaft. Trimming consists of three, but in some cases four, cut marks. The foreshaft insert sinew is about 20 to 22 mm. in length and recessed about 1 to 2 mm. from the trimmed edge. A riband occurs beneath this wrapping on all specimens. On four it is black, and 2-3 mm. in length, while on the remainder it is green and about twice as long. No further ribands occur on mainshaft or foreshaft.

Foreshafts are painted light red on four specimens and dark red on the others. The latter color is speckled with tiny flakes of mica, evidently the result of mixing with the pigment. Lengths range from 127 to 182 mm., with slight distal tapering. The midpoint diameter is between 5 to 7 mm. Numerous small striations are present perpendicular to the shaft. These appear to be marks from a fine-grained abrading tool. The distal end has been trimmed into a sharpened point and then slotted into a "V" to receive the projectile point. The slot is 8 mm. deep on seven specimens, 10 mm. on two, and 11 mm. on another. All are sufficient in depth so that the tips of the foreshaft extend slightly beyond the projectile point notches when the latter is inserted into the slot.

The hafting method consists of asphaltum cement placed around the base of the point and reinforced by hafting sinew, varying from 6 to 15 mm. long. Wrapping patterns for attachment vary, with three discernable configurations: (1) a simple "X" from notch to foreshaft and crossing

back; (2) a "Bar-X" in which an additional wrapping is made across the face of the point from notch to notch; and (3) a "Bar" without the "X". The "Bar-X" is the most common and occurs on both faces of seven arrows, and the "X" on another. One arrow has the "Bar-X" with a "Bar" on the opposite face, while another, a "Bar-X" and "X".

On eight of the ten arrows, projectile points are Desert Side-notched. For the remainder, one point is missing while another has a triangular, concave base form, lacking side-notching. Lengths range between 20-30 mm. for the former type and 39 mm. for the latter. For all, widths are from 12-16 mm. and thicknesses, 3-4 mm. Notches are moderate in depth. Bases are slightly concave. All are made from Monterey chert, four white in color and the others gray. Retouching is fine, and the points are well-shaped and symmetrical.

CASTRO CANYON FIND

Two self-arrows, a hardwood foreshaft and a self-point, are currently in the private collection of Mrs. Una Halford of New Cuyama. These items are illustrated in close-up for the proximal ends of both arrows in Plate 2.

Location and association. The Halfords found these items about 13 years ago while exploring a dry cave in Castro Canyon. This region was once occupied by the Cuyama Chumash, neighbors of the Inezeño (Kroeber 1925: Plate 1; Landberg 1965: Fig. 1). Unfortunately, Mrs. Halford does not recall the location of her find, the type of setting in which it occurred, nor what the cave looked like. The discussion below is based upon a brief examination of the objects now displayed in the "Chumash Room" of her private museum.

The items themselves, she reports, were found wrapped with other artifacts in a piece of folded *Juncus* matting. The entire assemblage appears to include an arrowmaking kit, as well as items used in hunting or trapping small animals. Briefly, the associated artifacts are: a bundle of Red-Tailed Hawk *(Buteo jamaicensis)*, Turkey Vulture *(Cathartes aura)*, and Condor *(Gymnogyps californianus)* feathers; several pieces of cordage; a few flakes retouched into scrapers and burins; a small Desert Side-notched projectile point; a fossil shark tooth hafted to a small stick with sinew; a lump (pitch?) on a small stick covered with a red pigment the same color as found on the associated arrow foreshaft in the cache; a piece of folded rattlesnake skin; and a piece of worked animal skin, triangular-shaped and fringed, with a series of two parallel rows of perforations. In addition, six pairs of what may be "Figure 4" traps were present also. A description of these traps will be made in a forthcoming paper.

Arrows. Both self-arrows in the cache are of an unknown hardwood. Nocks on both are cylindrical in shape, and tips semi-blunt. Ribands are absent. One arrow, a stele, measures 77.6 cm. in length and 5 mm. in diameter. The notch is "V" in shape and 2 mm. deep. The other arrow measures 98.4 cm. in length and 9 mm. in diameter. Its notch is "U" in shape and 4 mm. in depth. Beneath the proximal and distal fletching sinews, remnants of split-quill still remain. These wrappings are 6 mm. in length for the former, and 13 mm. for the latter. The shaftment is 9.5 cm. in length and coated with traces of a black adhesive, perhaps pitch or asphaltum, apparently "smeared" on.

Excluding the stele, the remaining self-arrow shares only a few attributes with the Peachtree arrows. Similarities consist of notch and nock shape, radial fletching, and the method of sinew wrapping. Another trait is in the 2:1 length ratio between the proximal and distal fletching sinew, respectively. It is unfortunate that not enough of the feathering remains on the Castro specimen by which to determine whether or not it also had two feathers of one species of bird, and one feather of another.

Foreshaft and Self-Point. Evidence of composite arrows in Castro Canyon is in the form of a foreshaft and a self-point from the cache. For the former, it is slightly longer than those from the Peachtree, measuring 23.2 cm. in length and 7 mm. in diameter. Approximately 16 mm. of the proximal end is tapered into a truncated cone for insertion into the mainshaft. Traces of asphaltum or pitch cement and sinew-wrapping are present. The distal end is shaped into a slightly raised, 10 mm. long nock and slotted to receive the projectile point. Painted a dull red, the color of the nock matches that on the applicator tool noted earlier. Some 13 mm. of the hafting sinew remains, beginning at the base of the nock. Striations on the shaft are present and similar to those on the Peachtree foreshafts.

The remaining self-point is natural brown in color and 140 mm. in length. Diameter at the butt is 5 mm., and ribands are absent. The tip is pointed.

SALISBURY CANYON FINDS

Approximately 3 mi. southwest of Castro Canyon, a series of dry caves in Salisbury Canyon have yielded perishable artifacts (e.g., basketry, matting, etc.), now housed in the Museum. These form the James-Abels Collection described by Grant (1964), and include a foreshaft and two self-points.

Foreshaft. The foreshaft (NA-CA-SBaXX-3E-10), illustrated by Grant (1964: Pl. 13b, item no. 4430), is 24.5+ cm. in length. Some 5.6 cm. of the proximal end forms a tapering point and is covered with pitch or asphaltum cement. This segment was once inserted into a mainshaft. The distal end, of which most is missing, indicates that this substance was used also as a cement in hafting the projectile point, now missing. Small remnants of sinew wrapping are present at both ends of the shaft.

There are four dissimilarities in comparison with the Peachtree foreshafts. These are: (1) the sinew used is much wider; (2) sinew on the proximal shaft end would suggest that the foreshaft insert extended from mainshaft to foreshaft, a trait also found on the Castro foreshaft; (3) the foreshaft is slightly longer than any of the Peachtree foreshafts, again similar to the Castro foreshaft; and (4) the shaft is unpainted. Correspondences to the Peachtree foreshafts include: (1) striations on the foreshaft which are perpendicular to the long axis; (2) a tapering shaft; and (3) use of pitch or asphaltum as a cement. These traits are found on the Castro foreshaft too.

Self-Points. Two other items from the collection are self-points, also illustrated by Grant (1964: Pl. 13b, item no. 4430). One (NA-CA-SBaXX-13E-10[1]) is 17.5 cm. in length, tapering to a semi-blunt tip. The midpoint diameter is 7 mm. Perpendicular striations and a residue of red paint are present. Traces of pitch or asphaltum cement are located on the proximal end. The other self-point, (NA-CA-SBaXX-3E-11), is 18.0 cm. long, with a midpoint diameter of only 4 mm. Tapering, its tip is somewhat pointed. Both self-points are similar in form to the Castro specimen.

DISCUSSION AND COMPARISON

Aside from the finds described here, no other examples of Chumash arrows are documented. Thus, we are left with descriptive statements, such as Harrington (1942: 14-15), or Font (Bolton 1930: 255). The reference to them by Font is of much interest, since he is obviously describing Chumash self-arrows. He writes that "their arrows are of wood and very well and carefully made, and not of reeds like those commonly used by the Apaches, Pimas, and the others." The reference to lacking cane arrows is puzzling. Composite fishing arrows, with detachable foreshafts, are described for the coastal Barbareño and Ventureño (Hoover 1973: 5), while Chumash informants of Harrington (1942: 14-15) have reported both self- and composite arrows among these groups.

In any event, Harrington (1942: 14-15) describes Chumash composite arrows as stone-tipped and fletched radially. This description is in agreement with the Peachtree arrows. Given that Manke has been correct in his account of the find, it is reasonable to infer that the Peachtree arrows are Chumash.

There is the possibility, however, that these composite arrows were the product of some other native people, possibly Yokuts as they moved through the mountains en route to the coast. For this reason, it is wise briefly to compare this material with neighboring cultures.

For the northern Salinan, little is known concerning their arrows, and, like the Esselen, the meager accounts of native informants report both self- and composite arrows, radially fletched (Harrington 1942: 14; Kroeber 1925: 545).

As for the Yokuts, more is known. Kroeber (1925: 530) states that three types of arrows were used: (1) a self-arrow with long, wooden point for war; (2) a composite arrow with self-point for hunting; and (3) a composite arrow with stone projectile point for deer.

The composite arrow consisted of a cane mainshaft and a hardwood foreshaft of either live oak *(Quercus)*, chamise *(Adenostoma)*, or wild lilac *(Ceanothus)*, (Latta 1949: 52-56; Gayton 1948: 72-73). Unlike the Peachtree specimens, Yokuts arrows were completely fletched with hawk feathers, either wing or tail, with the Red-Tailed Hawk being preferred, though on occasion Great Horned Owl *(Bubo Virginianus)* was also used (Latta 1949: 52-56). Fletching was radial, with sinew and asphaltum used for fastening. For deer a hafted stone tip would be used, held in place by sinew wrapping. A coating of asphaltum was applied over this to both reinforce the hafting as well as to prevent the arrow from detaching from the wound once the sinew had become blood-soaked. These arrows averaged 61 cm. in length according to Gayton (1948: 72-73), or slightly shorter than the Peachtree specimens.

Yokuts self-arrows were made usually from long, straight shoots of gooseberry *(Ribes* sp.*)*, though other woods were sometimes selected (Latta 1949: 52-56).

Pope (1923: Pl. 55, Fig. 8) illustrates a Yokuts bird arrow which he notes as somewhat unusual. Measuring some 84 cm. in length, this composite arrow is unusual for its spiral fletching and long nock. It shares very few features with the Peachtree material.

The recovery of a single Serrano arrow, found in a rock crevice in San Bernardino County and described by Rozaire (1962), provides comparisons with material from the mountainous east. This arrow measures 80 cm. in length, and 9 mm. in diameter at the mainshaft. It falls within the range of

Peachtree dimensions. The mainshaft is cane *(Phragmites communis)* and the foreshaft, ribbon wood *(Adenostema sparsifolium)* a hardwood. The cane has been trimmed similiar to the Peachtree arrows: three cut marks appear at the distal end. Another similarity is the point form -- a Desert Side-notch. As opposed to the "Bar-X" pattern, however, the Serrano specimen has the simple "X" pattern, reinforced with sticky material, possibly pitch. Though notch depth is similar, the shape is a "V" rather than the Peachtree "U". Fletching placement is also different in that they partly cover over the notch; it is, however, radial.

The most striking parallel occurs in the type of feathers selected for the Serrano fletching. It will be recalled that each of the Peachtree specimens has two Western Red-Tailed Hawk henfeathers and one Golden Eagle cockfeather. For the Serrano arrow, these are two henfeathers of the Western Red-Tailed Hawk, and a cockfeather of an adult Pallid Horned Owl *(Bubo virginianus pallescens)*.

Serrano riband markings are distinct from those of the Peachtree. A brownish-red color occurs on the shaftment and a 9 mm.-wide black band is situated beneath the foreshaft insert sinew. There are also more dark ribands on the foreshaft.

For the Gabrielino, who occupied territory south of the Chumash, extant arrows are lacking. From descriptions, however, it is known that a cane composite arrow was used, either with or without stone points, and fletched with three radial feathers (Johnston 1962: 34).

These comparisons indicate that the arrows described in this paper are typical for Southwestern California composite and self-arrows, with similarities more strongly indicated between the Serrano specimen and those from the Peachtree. They are, however, distinct enough to be considered of local manufacture. As to function, the suggestion that the Peachtree arrows are for deer seems warranted for two reasons: (1) stone-tipped, composite arrows are known to have served such a function throughout Southern California (Kroeber 1925: 818); and (2) the association of these arrows (and accompanying bows) with a very rich deer hunting locale. As for the semi-blunt self-arrows from Castro Canyon, they probably served for hunting smaller game at close range (Kroeber 1925: 818). Harrington (1942: 14) notes that the Ventureño used the stele to hunt birds.

In conclusion, the Chumash had at least three different types of arrows: (1) composite arrows with stone projectile points for hunting deer; (2) composite arrows with self-points (warfare?); and (3) self-arrows for small game hunting, such as mammals and birds.

AGE DETERMINATIONS

To determine the age of the Peachtree, Castro, and Salisbury Canyon finds, three sources of evidence seem appropriate to use here, based upon present estimates for the introduction of various artifacts into South Coastal California. These are: (1) the bow and arrow itself; (2) the shaft straightener, an artifact associated with cane composite arrows; and (3) the Desert Side-notched project point. Cane arrows are represented at all three canyon finds, while the particular projectile point type is associated with the Peachtree and Castro canyons.

For the introduction of the bow and arrow, Willey's synthesis for South Coastal California (1966: 367, 374) places the event as sometime after A.D. 250. The artifacts are a diagnostic feature of the Late Horizon Canaliño along the Santa Barbara Channel.

The arrowshaft straightener narrows this 1,700 year range down to 600 years. The artifact in particular is associated with cane composite arrows in California (Kroeber 1925: 818). Thus, the age of one reflects to some extent the age of the other. Eberhart (1957: 175) places a date of sometime between A.D. 1000 and historic contact for its introduction into South Coastal California, with A.D. 1300 more definite.

Dates for the introduction of the Desert Side-notched projectile point reduces the 600 year range by half. This point type is a diagnostic of late archaeological manifestations throughout the arid Western United States (Baumhoff and Byrne 1959: 33). Though common in the eastern regions of California, it is rare along the California Coast, particularly from Orange County northward. Nearer Santa Barbara, a few points have been recovered, such as at Buena Vista Lake, Kern County (Wedel 1941) and Conejo Rockshelter, Ventura County (Glassow 1965: 36-37). The former locality is peripheral to Chumash territory, while the latter is within it. Dating these points in Santa Barbara County is tentative, but Baumhoff and Byrne (1959: 60) estimate a date of A.D. 1650 for its introduction from the east into the southern, Chumash adjoining, San Joaquin Valley.

To diverge for a moment here, Glassow (1965: 52), after finding only a few of these points in his Conejo excavation, advanced two interesting hypotheses as to why the Desert Side-notched point may have failed to gain acceptance along the Santa Barbara Channel. These are: (1) that the established coastal use of asphaltum cement for hafting projectile points may have been the barrier to accepting a new point type; of (2) that the Desert Side-notched point had not yet diffused to the Channel area prior to European contact. The data in this paper support the second alternative, since the Peachtree arrows illustrate well the compatability of asphaltum cement and this type of projectile point. Thus, the A.D. 1650 date for the earliest introduction of the point type east of the Chumash suggests that historic interruption was more likely a barrier to its introduction to the coast.

It would seem then that a date later than A.D. 1650 is warranted for the Santa Barbara items. It is reasonable to infer on the basis of their condition and location, that these artifacts are more probably the manufactures of historic Chumash groups occupying the mountainous interior of Santa Barbara County as late as the 1800's.

GROUP ORDERING AND INFERENCES

The recovery of a quantity of arrows from a single cache (Peachtree find) offers a unique opportunity to examine variability and from it derive inferences into the nature of Chumash hunting strategy, arrow-making, and residence institutions. One technique to examine the nature of variability is to determine attribute clusterings by comparing each arrow with the others, grouping together those arrows which exhibit shared attributes as opposed to those which do not.

The basic assumptions which are used here are based upon determining meaningful patterning of the attributes in terms of types and levels of human behavior represented, since the Peachtree arrows are viewed as the product of such human activities (cf. Deetz 1968: 41-42). From this, inferences are made to account for the possible causes of the observed patterning. Essentially, the products of three types of human behavior should be indicated. These are: (1) the individual arrowmaker; (2) a minimal group of interacting males; and (3) a larger socio-cultural entity, possibly the community or tribe.

Following Deetz (1968: 42), it is assumed here that the nature of these patterns will be reflected by the attribute clustering. On the individual level of behavior, the patterning will be exhibited by independent groupings. For the next higher level, the minimal group, it should take the form of combinations of shared attributes, or grouped together, a common style. Larger socio-cultural patterning would be styles also, but since comparative Chumash arrows from other regions are non-existant, this level can only be postulated here.

A group ordering of the Peachtree arrow attributes is provided in Table 2 (Appendix B), using nine specimens; the data and attribute numbers listed in the figure are derived from Table 1. By ignoring the non-varying attributes shared by all specimens (e.g., nock color, mainshaft material, etc.) 23 meaningful attributes displaying variability on the individual and minimal group levels are indicated. The excluded attributes may also reflect minimal group or larger socio-cultural behavior.

It can be seen that 11 attributes, or about 48%, are meaningful in forming two major clusters, labeled Groups I and II. The specific attributes which separate both are foreshaft and hafting sinew lengths, and eight other attributes concerned with ribands and their lengths. It will be noted that within Group II, three attributes, or about 27% of the group itself, are significant in forming subgroupings, labeled IIa, IIb, and IIc. These, I believe, represent functional as opposed to social variation and will be discussed as such later in this section.

Groups I and II, by their differences in shaftment riband and size, thus represent the individual behavior of two men, assuming that arrowmaking was a male activity among the Chumash. The arrows of one man were marked with a Black-Natural-Red riband shaftment, while the other with a Green-Natural-Red. A statement made by Mason (1894: 662) on riband markings, based upon his now-classic study of many North American Indian arrows, lends support to this contention. He states that he found the following to be true:

> ...arrows in the same quiver have the same riband; arrows in the same tribe have the same general type of riband; and the same colors occur in old arrows. From tribe to tribe there occur differences in riband....

The shaftment riband configuration of the Peachtree arrows thus leads to two inferences: (1) that the difference in proximal color is an individual expression, such as an ownership marking; and (2) that the similarity in central and distal color is a shared, stylistic expression of the minimal group.

The second inference above leads us to postulate the nature of this male minimal group as being a unilocal institution, perhaps patrilocal. The inference is based upon the premise that the attributes at the minimal group level should be more similar than dissimilar, since the patterning would be the result of arrowmaking derived from one, family-based microtradition or style (Deetz 1968: 45). A unified style in male-made artifacts would not be expected to occur if each arrowmaker had learned his art independently of an from a distinct microtradition from the other. Deetz (1968: 45) has previously come to the same conclusion of patrilocal residence for the Chumash based upon the high degree of localized styles found in one male-manufactured arrow component such as the projectile point. His determination has independently supported the statements by Brown (1967: 5, 10) and Landberg (1965: 29) that the Chumash had this type of social institution.

As for the Peachtree specimens, the nature of this microtradition in arrowmaking is reflected by 12 attributes, or about 52%, of those listed in Table 2. There are, however, two subgroupings within these 12 which do not form "shared" styles, and will be discussed at greater length later. Those which do fit the pattern are: shaftment riband, pattern of hafting, projectile point form, foreshaft colors, type (species and age of bird) of feathering selected for fletching, shape and color of the nock, type of sinew, and dimensional correspondences in arrow parts.

The latter in particular hints at a close relationship between the two arrowmakers. Mainshaft lengths, closely clustering around 58 cm. for Groups I and IIa, suggest that these were determined by using one mainshaft for comparison with the others. Ewers (1970: 561-562) has pointed out that among the Blackfoot, each arrowmaker established the length of his arrows according to his own mensuration scale. The conclusion thus follows that the Peachtree arrows in both groups were measured and cut by the same man, and no doubt at the same time. Two explanations come to mind: (1) that arrowmaking may have been a specialization, and thus the differences are still individual and not minimal group behavior; or (2) that each man gathered and prepared various materials for arrow manufacture but shared those products in and among other members of his minimal group.

That the latter explanation seems the more likely is indicated when the differences in other arrow attributes between the two groups are taken into account. These differences are individual expressions of behavior, such as foreshaft lengths (Group I, 16 cm.; Group IIa, 14-15 cm.), and fletching lengths (Group I, 10.5-10.8 cm.; Group IIa, 11.3-11.7 cm.).

As noted earlier, the internal variation within Group II is, I believe, functional as opposed to social. Three subgroupings are indicated in Table 2, labeled Group IIa, IIb, and IIc. The differences between each are reflected by three attributes in particular: (1) foreshaft lengths; (2) mainshaft lengths (and thus overall length as well); and (3) the color of the riband beneath the proximal fletching sinew. In this regard, the groupings are as follows: IIa consists of short arrows (74.5-75.1 cm.) and a green riband; IIb, long arrows (82.0 cm.) and a purple riband; and IIc, an intermediate-sized arrow (80.8 cm.) with a natural cane color instead of the painted band. Additional differences separate IIc from the remainder. These are in the lengths of: (1) the distal and proximal ribands on the shaftment, and (2) that of the foreshaft insert sinew.

The conclusion here is that for some reason there is a correlation between proximal fletching sinew riband colors and arrow lengths. Since Chumash arrows are known to have been carried in a skin quiver and drawn from over the shoulder (Fages 1951: 209; Harrington 1942: 15), would not such color markings on the protruding element of an arrow aid the hunter in selecting a desired length once it was masked by insertion into a skin container?

This view, of course, requires the assumption that arrow length would have functional importance to the hunter. Flint (1891: 66) notes that for long distances, lighter arrows are desired. Since length and weight vary directly, the possibility that longer arrows would be more favorable for closer ranges becomes tenable, particularly since they would have an added advantage of greater penetration force, up to certain limits (Pope 1923: 359). The conclusion follows, then, that the various color riband markings on Group II's arrows were to aid him in singling out an arrow either for distance, or for greater penetration, thus giving him even greater versatility in his hunting strategy.

In terms of bow and arrow use among the Chumash, we can add a little more to Harrington's (1942: 15) statement that the angle of aiming was in a slanting position and that the release was secondary. Our new information concerns how far the arrow was drawn in the bow. From Pope's (1923: 333) study, we know that the average archer cannot draw an arrow more than 73.7 cm. and that 62.5 to 66.8 cm. is the more probable, average distance. The shorter Group I and IIa arrows, however, exceed the maximum by a little less than 2 cm. This means that some unknown segment of a Chumash arrow extended beyond the bow, but by how much? If we consider the absolute value of 73.7 cm., then 2 cm., 7.1 cm., and 8.3 cm. would be the extension distances for Group II's short, medium, and long arrows, respectively. We can only conclude here that whatever the extension distance was, it no doubt was probably much greater than this. Gayton (1948: 72-73) notes, for instance, that the Yokuts had about a 5 cm. arrow extension.

Turning finally to the entire cache for interpretation, the basic question which arises is this: Why cache two bows, a bundle of arrows, and a basket in a cave? Two alternatives present themselves, one involving the least known area of Chumash culture, their religious behavior, while the other and more logical explanation involves their hunting tactics. A discussion of both is provided below, beginning with religious practices.

This alternative pivots around two ideas. First, Harrington's (1942: 41) note that the Inezeño Chumash made arrow offerings to the Sun and Moon is suggestive. Second, there is Grant's (1965: 77) finding that cave locations have particular association in Chumash culture with supernatural-ceremonial phenomena. As for the items themselves, the long arrows in Group IIb further support this possibility, in that such arrows among some California Indians, in particular the Yana, were not made for hunting or war alone, but also for show, ceremonial activities, or gift giving (Pope 1923: 394, Pl. 54, Figs. 8-13). Thus, the Peachtree Canyon cache could well represent such an offering in a ceremonial context.

The second alternative concerns Chumash hunting strategy and rests heavily upon the inferences made earlier in this paper. These are, to review them briefly, that two hunters are represented, that each man was in a cooperative relationship with the other, perhaps as members of a patrilocal band, and that their composite arrows with stone projectile points were intended for hunting deer. The conclusion is that both men prepared their equipment for deer hunting and stored it in a deer-rich area, but failed to return for the hunt. The hunting strategy itself was probably very much like that of the Yokuts, whereby a deer hunter would often take another hunter along with him to increase the chances of success, with the mutual understanding that the kill would be equally shared (Gayton 1948: 71).

CONCLUSIONS

The Chumash archery equipment described in this paper has provided additional information with which to supplement the meager historic and ethnographic data on their form and use. These descriptions indicate that Chumash arrows in particular were typically Southern Californian in form, with their closest identities in arrowmaking to be found eastward, along the Tehachapi Mountains, to the Serrano. Indeed

the associated Desert Side-notch projectile points in the Peachtree and Castro Canyon finds further supports this eastward connection.

Despite these similarities, there are some arrow features, which should be viewed tentatively on the basis of our limited sample size, indicated to be somewhat localized, perhaps diagnostic of Chumash arrows. These are: (1) the use of Red-Tailed Hawk (for henfeathers) and Golden Eagle (cockfeather) in arrow fletching; (2) the subdivision of the shaftment riband into thirds; and (3) the U-shaped notch. Others might include a red nock color, lack of foreshaft ribands, mainshaft materials, etc.

Chumash arrowmaking attributes indicate behavior on the individual and minimal group levels. Individual behavior is reflected in foreshaft and hafting sinew lengths, and riband configuration on the shaftment. Minimal group attributes, based upon evidence of a family-based microtradition, consist of shaftment riband configuration, pattern of hafting, projectile point form, foreshaft colors, type of fletching, type of sinew and method of wrapping, and numerous dimensional correspondences in arrow parts.

The conclusion is that two hunters, who cooperated in arrowmaking, are re
Canyon find. Both men also apparently planned to cooperate in the hunt, per
that the kill would be mutually shared. Evidence has been advanced that both
patrilocal community.

Three types of Chumash arrows have been described. These are: (1) composite arrows with stone projectile points for hunting deer or larger mammals (elk?); (2) composite arrows with self-points (warfare?); and (3) self-arrows for hunting small game at close range. Evidence has been advanced to indicate that arrows in the first grouping may have been gaged in terms of their lengths to provide the individual hunter with the option to increase shooting distance (with shorter, lighter arrows) or penetration power (longer, heavier arrows). If such is the case, Chumash hunting strategy was versatile. Identification of arrow lengths was quite probably by color coding beneath the proximal fletching sinew: the segment of the arrow which would extend outside the quiver and therefore be visible to the hunter. When selected and fully drawn in the bow, at least some segment of even the shortest of arrows would extend at least 2 cm. beyond the bow.

It is unfortunate that only half of the Peachtree Canyon arrows have survived, and that both self-bows have been lost. It is equally a loss that much of the association and contextual data for the Salisbury and Castro Canyon specimens is also wanting. Nevertheless, these rare and unique items of Chumash archery equipment have expanded to some degree our information into their manufacture, use, and social relationships.

APPENDIX A

ARROW TERMINOLOGY

ADHESIVE. A substance used as a cement for the projectile point, foreshaft, and/or self-point.

COCKFEATHER. One of three feathers of the fletching which is stiffer than the others (henfeathers). This definition departs from the usual one based upon the relationship of this feather to that of the bowstring.

COCKFEATHER ORIENTATION. The angle of the cock-feather when the notch is placed vertically and this feather is to the right, as viewed from the nock.

COMPOSITE ARROW. An arrow made of two or more parts: (1) a cane mainshaft; (2) a hardwood foreshaft or self-point; and (3) a projectile point in lieu of a self-point.

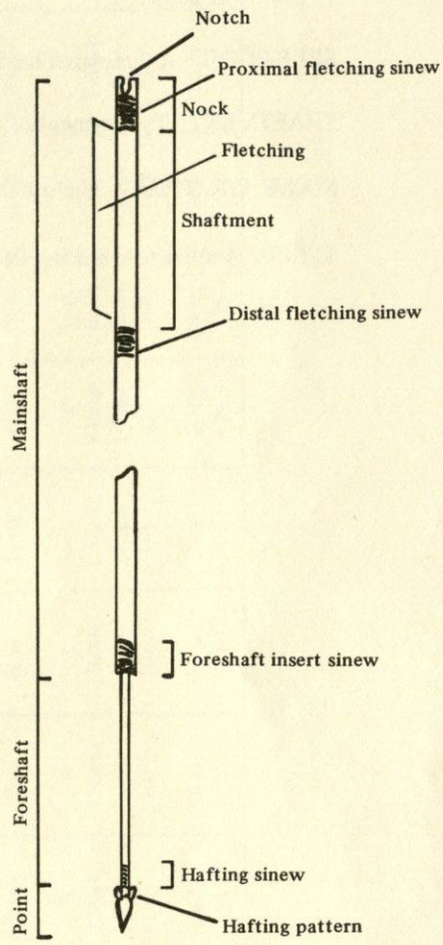
FLETCHING. The three feathers bound to the mainshaft at the proximal end of the arrow at the shaftment.

FORESHAFT. The piece of hardwood which is inserted into the mainshaft at one end and slit at the other to receive a projectile point.

HAFTING PATTERN. The configuration of the sinew used to bind the projectile point to the foreshaft.

MAINSHAFT. The cane segment of a composite arrow.

NOCK. The section of the proximal end of the arrow which begins at the butt and terminates at the beginning of the proximal fletching sinew.



NOTCH. The slit in the nock to receive the bowstring.

POINT. The portion of the arrow intended to penetrate. There are two types: self-points and projectile points.

POINT ORIENTATION. The angle of the projectile point when the notch is placed vertically and the cockfeather is to the right, as viewed from the nock.

RADIAL. The placement of the fletching longitudinally to the mainshaft and equidistant.

RIBAND. One or more painted bands which appear on the mainshaft, shaftment, or foreshaft of an arrow.

SELF-ARROW. An arrow made from a single piece of wood. It may or may not have a hafted projectile point.

SELF-POINT. A sharpened hardwood foreshaft serving as a penetrating point.

SHAFTMENT. The segment of the mainshaft on which the feathering or fletching is fastened.

SINEW WRAPPING. The use of thread-like sinew to fasten or reinforce arrow parts.

STELE. A self-arrow lacking fletching and projectile point.

Table 1. Attribute data on 10 composite arrows from Peachtree Canyon. All measurements are expressed in mm.
Abreviations: DSN = Desert Side-notched projectile point; TC = triangular projectile point with concave base; A = attribute cannot be observed (arrow part missing).

Attribute	Santa Barbara Museum of Natural History				Mr. Jack Coy	Dr. Albert C. Heimlich				Mr. Campbell Grant
	NA-CA-SBaXX-4E-1	NA-CA-SBaXX-4E-2	NA-CA-SBaXX-4E-3	NA-CA-SBaXX-4E-4		No. 1	No. 2	No. 3	No. 4	
Group Ordering (cf. Table 2)	IIB	IIa	I	I	IIa	IIc	I	IIa	IIb	?
1. Overall length	820	745	755	755	735+	808	750	750	820	A
MAINSHAFT ATTRIBUTES										
2. Length	625	580	575	577	580	609	580	582	628	462+
3. Diameter	8	8	8	7	8	9	8	9	8	9
NOCK										
4. Shape	Cylin.	Cylin.	Cylin.	Cylin.	Cylin.	Cylin.	Cylin.	Cylin.	Cylin.	A
5. Color	Red	Red	Red	Red	Red	Red	Red	Red	Red	A
NOTCH										
6. Shape	U	U	U	U	U	U	U	U	U	A
7. Depth	7	8	8	8	7	7	7	7	8	A
PROXIMAL FLETCHING SINEW										
8. Wrapping length	12	11	10	10	10	10	10	9	9	A
9. Riband color	Purple	Green	None	None	Green	None	None	Green	Purple	A
FLETCHING										
10. Radial (No. Feathers)	3	3	3	3	3	3	3	3	3	A
11. Type of Feathers	2 Hawk, 1 Eagle	2 Hawk, 1 Eagle	2 Hawk, 1 Eagle	2 Hawk, 1 Eagle	2 Hawk, 1 Eagle	2 Hawk, 1 Eagle	2 Hawk, 1 Eagle	2 Hawk, 1 Eagle	2 Hawk, 1 Eagle	A A
12. Length	115	115	105	105	113	115	108	116	117	A
SHAFTMENT RIBAND										
13. Proximal color	Black	Black	Green	Green	Black	Black	Green	Black	Black	A
14. Length	40	38	40	42	35	28	36	38	43	A

Table 1, Continued

15. Central color	None	None	None	None	None	None	None	None	None	A
16. Length	47	54	30	33	53	42	38	48	51	A
17. Distal color	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
18. Length	28	23	35	30	25	35	34	30	23	5+
DISTAL FLETCHING SINEW										
19. Wrapping length	28	28	24	22	24	22	22	21	27	A
FORESHAFT INSERT SINEW										
20. Wrapping length	20	21	22	20	21	30	20	21	22	20
21. Trimming cuts	3	3	3	4	4	3	3	3	3	4
22. Riband color	Black	Green	Green	Green	Green	Black	Black	Green	Black	Green
23. Riband length	2	4	4	4	5	2	3	5	3	4
FORESHAFT ATTRIBUTES										
24. Length	170	145	160	160	150	182	160	146	172	127
25. Diameter	5	5	6	5	6	7	6	7	7	5
26. Color	Light Red	Light Red	Dark Red	Dark Red	Dark Red	Light Red	Dark Red	Dark Red	Light Red	Dark Red
27. Hafting notch shape	V	V	V	V	V	V	V	V	V	V
28. Notch depth	8	8	8	8	8	10	10	8	8	11
29. Wrapping sinew length	17	15	10	8	12	15	6	15	14	11+
30. Asphaltum cement (?)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
31. Hafting pattern	X-	XX	XX	XX	XX	XX	XX	XX	XX	XX
PROJECTILE POINT										
32. Type	DSN	DSN	DSN	DSN	A	DSN	DSN	DSN	DSN	TC
33. Material	Chert	Chert	Chert	Chert	A	Chert	Chert	Chert	Chert	Chert
34. Length	30	23	25	20	A	28	22	29	28	39
35. Width	14	12	13	13	A	12	12	13	16	13
36. Thickness	4	4	4	3	A	4	3	4	4	4
37. Color	White	White	White	White	A	Gray	Gray	Gray	Gray	Gray
ORIENTATION										
38. Notch to cockfeathers	90°	90°	135°	90°	45°	135°	30°	135°	135°	A
39. Notch to Projectile point	00°	45°	135°	135°	45°	00°	45°	45°	135°	A

Table 2. Group ordering of selected attributes, based upon data provided in Table 1. Attribute numbers listed below correspond to those in the table.

Group:		I			IIa			IIb		IIc
INDIVIDUAL BEHAVIOR	39.	135°	135°	00°	45°	45°	45°	00°	135°	45°
	9.	N	N	N	G	G	G	P	P	N
	24.	160	160	160	145	150	146	170	172	182
	13.	G	G	B	G	G	G	B	B	B
	16.	30	33	38	54	53	48	47	51	42
	18.	35	30	34	23	25	30	28	23	35
	13.	G	G	G	B	B	B	B	B	B
	15.	N	N	N	N	N	N	N	N	N
	17.	R	R	R	R	R	R	R	R	R
	12.	105	105	108	115	113	116	115	117	115
	29.	10	8	6	15	12	15	17	14	15
MINIMAL GROUP BEHAVIOR	2.	575	577	580	580	580	582	625	628	609
	1.	755	755	750	745	735+	750	820	820	808
	14.	40	42	36	38	35	38	40	43	28
	26.	DR	DR	DR	LR	DR	DR	LR	LR	LR
	34.	25	20	22	23	A	29	30	28	28
	35.	13	13	12	12	A	13	14	16	12
	20.	22	20	20	21	21	21	20	22	30
	8.	10	10	10	11	10	9	12	9	10
	19.	24	22	22	28	24	21	28	27	22
	31.	XX	XX	XX	XX	XX	XX	X-	XX	XX
	37.	W	W	G	W	A	G	W	G	G
	38.	135°	90°	30°	90°	45°	135°	90°	135°	135°
		NA-CA-SBaXX-4E-3	NA-CA-SBaXX-4E-4	Heimlich No. 2	NA-CA-SBaXX-4E-2	Coy	Heimlich No. 3	NA-CA-SBaXX-4E-1	Heimlich No. 4	Heimlich No. 1

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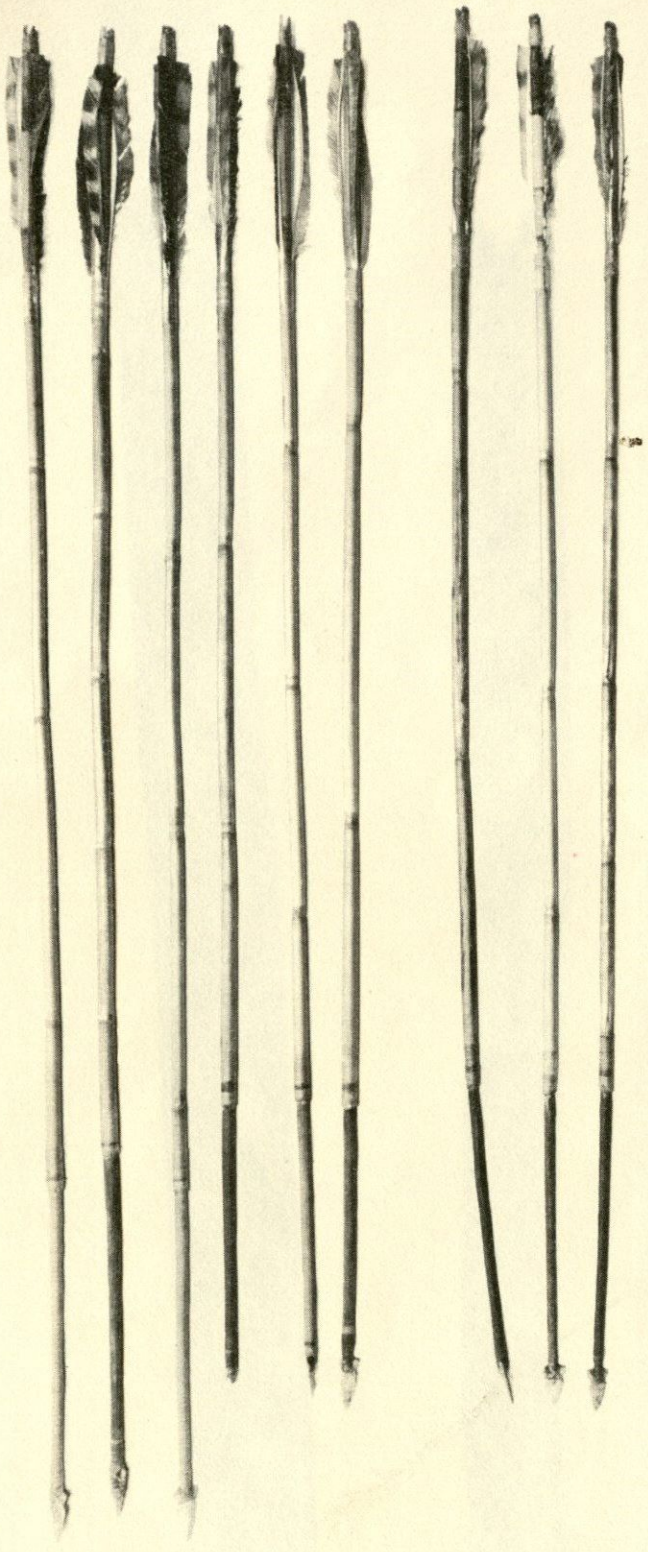
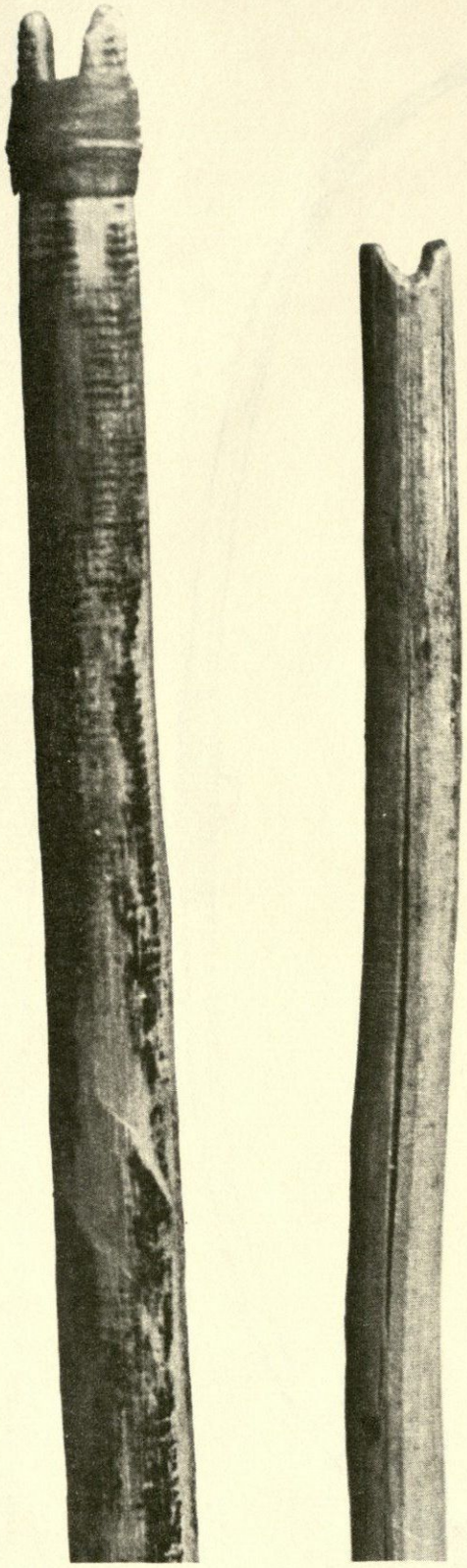
PLATE 1



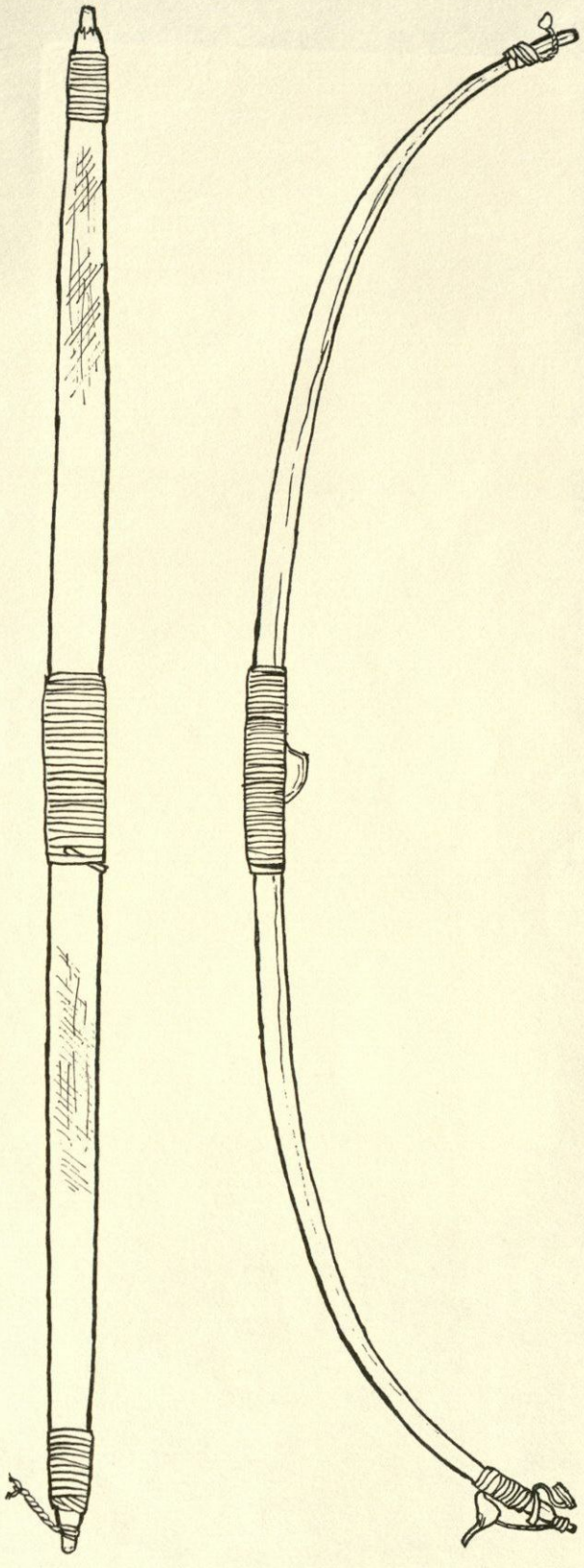
Nine composite arrows from a dry cave cache in Peachtree Canyon, Santa Barbara County. Scale: longest is 820 mm.

PLATE 2



Nocks on two self-arrows from a dry cave cache in Castro Canyon, Santa Barbara County. Left, self-arrow, with proximal fletching sinew measuring 6 mm. Right, stele.

PLATE 3



Vancouver bow, collected in Santa Barbara, 1793. Length is 105.5 cm.
(After Read 1892: Plate XI, fig. 6 and Robinson 1955: fig. 3.)